embodiments, the user can provide input additionally or alternatively through voice recognition, where a microphone on the device inputs the user's voice which is translated to appropriate commands or data by software running on the device. Physical buttons **84** can also be included in the housing of the device **80** to provide particular commands to the device **80** when the buttons are pressed. Many PDA's are characterized by the lack of a standard keyboard for character input from the user; rather, an alternative input mode is used, such as using a stylus to draw characters on the screen, voice recognition, etc. However, some PDA's also include a fully-functional keyboard as well as a touch screen, where the keyboard is typically much smaller than a standard-sized keyboard. In yet other embodiments, standard-size laptop computers with standard keyboards may include flat-panel touch-input display screens, and such screens (similar to screen **12** of FIG. **1**) can be provided with haptic feedback.

[**0074**] The touch screen **82** provides haptic feedback to the user similarly to the touchpad **16** described in previous embodiments. One or more actuators **86** can be coupled to the underside of the touch screen **82** to provide haptic feedback such as pulses, vibrations, and textures; for example, an actuator **86** can be positioned near each corner of the screen **82**, as shown in FIG. **8***a*. Other configurations of actuators can also be used. The user can experience the haptic feedback through a finger or a held object such as a stylus **87** that is contacting the screen **82**.

[**0075**] As shown in FIG. **8***b*, the touch screen **82** is preferably coupled to the housing **88** of the device **80** by one or more spring or compliant elements **90**, such as helical springs, leaf springs, flexures, or compliant material (foam, rubber, etc.) The compliant element allows the touch screen **82** to move approximately along the z-axis, thereby providing haptic feedback similarly to the touchpad embodiments described above. Actuators **86** can be piezo-electric actuators, voice coil actuators, or any of the other types of actuators described above for the touchpad embodiments. As shown in FIG. **8***b*, the actuators **86** are directly coupled to the touch screen **82** similarly to the touchpad embodiment of FIG. **3**; alternatively, an inertial mass can be moved to provide inertial feedback in the z-axis of the touch screen, similarly to the touchpad embodiment of FIG. **6**. Other features described above for the touchpad are equally applicable to the touch screen embodiment **80**.

[**0076**] In the embodiments of touch input devices (touchpad and touch screen) described herein, it is also advantageous that contact of the user is detected by the touch input device. Since haptic feedback need only be output when the user is contacting the touch device, this detection allows haptic feedback to be stopped (actuators "turned off") when no objects are contacting the touch input device. This feature can conserve battery power for portable devices. If a local touch device microprocessor (or similar circuitry) is being used in the computer, such a microprocessor can turn off actuator output when no user contact is sensed, thus alleviating the host processor of additional computational burden.

[**0077**] While the subject matter has been described in terms of several preferred embodiments, it is contemplated that alterations, permutations, and equivalents thereof will become apparent to those skilled in the art upon a reading of the specification and study of the drawings. For example, many different types of actuators can be used to output tactile sensations to the user. Furthermore, many of the features described in one embodiment can be used interchangeably with other embodiments. Furthermore, certain terminology has been used for the purposes of descriptive clarity, and not to be limiting.

What is claimed is:

1. A haptic feedback device comprising:

a housing;

one or more portions separately movable relative to the housing;

a first actuator configured to impart haptic force to one of the separately movable portions; and

a second actuator configured to impart haptic force to another of the separately movable portions, or to the housing.

2. A portable communication device comprising:

a touch screen capable of displaying graphical objects therethrough;

a first actuator configured to impart a first haptic effect to the touch screen at a first frequency; and

a second actuator configured to impart a second haptic effect to the touch screen at a second frequency simultaneously to provide a third haptic effect to be felt by a user.

3. A haptic feedback device comprising:

a housing;

a touch screen coupled to the housing; and

an actuator coupled to the housing or the touch screen by way of one or more springs and configured to impart haptic force to the touch screens, wherein the touch screen is moveable with respect to the housing in a vertical direction.

4. A haptic feedback device comprising:

a display configured to display one or more graphical items, at least one of which has an active state; and

an actuator configured to impart to the haptic feedback device a haptic force associated with a displayed graphical item that is in an active state.

5. A method of indicating relative importance in selection of a displayed graphical object, the method comprising:

displaying a plurality of graphical objects through a touch screen, wherein the graphical objects are individually selectable by a user;

sensing the user's selection of one or more graphical objects via the touch screen; and

outputting a first haptic effect upon sensing a first graphical object is selected by the user, wherein the first graphical object has a first importance value; and

outputting a second haptic effect upon sensing a second graphical object is selected by the user, wherein the second graphical object has a second importance value; wherein the second haptic effect is greater in magnitude than the first haptic effect.

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